Generation of T lineage cells from human embryonic stem cells in a feeder free system.

Journal: Stem Cells

Publication Year: 2009

Authors: Zoran Galic, Scott G Kitchen, Aparna Subramanian, Greg Bristol, Matthew D Marsden, Arumugam Balamurugan, Amelia Kacena, Otto Yang, Jerome A Zack

PubMed link: 18974209

Funding Grants: Human Embryonic Stem Cell Therapeutic Strategies to Target HIV Disease, Genetic Enhancement of the Immune Response to Melanoma via hESC-derived T cells, CIRM Type I Comprehensive Training Program

Public Summary:

Scientific Abstract:
Human embryonic stem cells (hESC) have the potential to revolutionize certain medical treatments, including T-cell-based therapies. However, optimal approaches to develop T cells from hESC are lacking. In this report, we show that T-cell progenitors can be derived from hESC cultured as embryoid bodies (EBs). These EB-derived T-cell progenitors give rise to phenotypically and functionally normal cells of the T lineage when transferred into human thymic tissue implanted in immunocompromised mice, suggesting that introduction of these progenitors into patients may also yield functional T cells. Moreover, hematopoietic progenitors demonstrating T-cell potential appeared to be CD45+/CD34+, resembling those found in normal bone marrow. In contrast to T cells developed from hESC cocultured on murine stromal cells, the EB-derived T cells also expressed normal levels of CD45. Importantly, the EB system eliminates the previous need for murine cocultures, a key impediment to developing a protocol for T-cell progenitor derivation suitable for clinical use. Furthermore, following lentiviral-mediated introduction of a vector expressing enhanced green fluorescent protein into hESC, stable transgene expression was maintained throughout differentiation, suggesting a potential for gene therapy approaches aimed at the augmentation of T-cell function or treatment of T-cell disorders.